Report Title

Ibrahim Dirar

April 25, 2022

Executive Summary

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Section title

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

Algorithm 1 is a good example of an algorithm in LaTeX.

Algorithm 1 Example caption: sum of all even numbers

Input: $\mathbf{x} = x_1, x_2, \ldots, x_N$
Output: $EvenSum$ (Sum of even numbers in $\mathbf{x}$)

```
1:  function EvenSummation(x)
2:      EvenSum ← 0
3:      N ← length(x)
4:      for i ← 1 to N do
5:          if x_i  mod 2 == 0 then                ▷ check if a number is even?
6:              EvenSum ← EvenSum + x_i
7:          end if
8:      end for
9:      return EvenSum
10: end function
```

Code Listing 1 is a good example of including a code snippet in a report. While using code snippets, take care of the following:

- do not paste your entire code (implementation) or everything you have coded. Add code snippets only.
- The algorithm shown in Algorithm 1 is usually preferred over code snippets in a technical/scientific report.
- Make sure the entire code snippet or algorithm stays on a single page and does not overflow to another page(s).

Here are three examples of code snippets for three different languages (Python, Java, and CPP) illustrated in Listings 1, 2, and 3 respectively.

```
1 import numpy as np
2
```

```
x  = [0, 1, 2, 3, 4, 5] # assign values to an array
evenSum = evenSummation(x) # call a function

def evenSummation(x):
    evenSum = 0
    n = len(x)
    for i in range(n):
        if np.mod(x[i],2) == 0: # check if a number is even?
            evenSum = evenSum + x[i]
    return evenSum
```

Listing 1: Code snippet in LaTeX and this is a Python code example

Here we used the "\clearpage" command and forced-out the second listing example onto the next page.

```java
public class EvenSum{
    public static int evenSummation(int[] x){
        int evenSum = 0;
        int n = x.length;
        for(int i = 0; i < n; i++){
            if(x[i]%2 == 0){ // check if a number is even?
                evenSum = evenSum + x[i];
            }
        }
        return evenSum;
    }
    public static void main(String[] args){
        int[] x  = {0, 1, 2, 3, 4, 5}; // assign values to an array
        int evenSum = evenSummation(x);
        System.out.println(evenSum);
    }
}
```

Listing 2: Code snippet in LaTeX and this is a Java code example

```cpp
int evenSummation(int x[]){
    int evenSum = 0;
    int n = sizeof(x);
    for(int i = 0; i < n; i++){
        if(x[i]%2 == 0){ // check if a number is even?
            evenSum = evenSum + x[i];
      }
    }
    return evenSum;
}

int main(){
    int x[]  = {0, 1, 2, 3, 4, 5}; // assign values to an array
    int evenSum = evenSummation(x);
    cout<<evenSum;
    return 0;
}
```

Listing 3: Code snippet in LaTeX and this is a C/C++ code example

References

Deschenes, A., n.d. *Accessible content guidelines* [Online]. (accessed April 18, 2022). Available from: `https://library.harvard.edu/accessible-content-guidelines`.

Fronczak, S., 2018. *Layered architecture: still a solid approach - dzone microservices*. Available from: `https://dzone.com/articles/layered-architecture-still-a-solid-approach`.

Gamma, E., Helm, R., Johnson, R., and Vlissides, J.M., 1994. *Design patterns: elements of reusable object-oriented software* [Online]. 1st ed. Addison-Wesley Professional. Available from: `http://www.amazon.com/Design-Patterns-Elements-Reusable-Object-Oriented/dp/0201633612/ref=ntt_at_ep_dpi_1`.

Grassi, P., Newton, E., Perlner, R., Regenscheid, A., Fenton, J., Burr, W., Richer, J., Lefkovitz, N., Danker, J., Choong, Y.-Y., Greene, K., and Theofanos, M., 2017. Digital identity guidelines: authentication and lifecycle management [Online]. Available from: `https://doi.org/10.6028/NIST.SP.800-63b`.

Harvard Library, n.d. *Writing guide* [Online]. (accessed April 18, 2022). Available from: `https://library.harvard.edu/writing-guide`.

Heidke, N., Morrison, J., and Morrison, M., 2008. Assessing the effectiveness of the model view controller architecture for creating web applications. *Midwest instruction and computing symposium, rapid city, sd*.

Hombergs, T., 2019. *Get your hands dirty on clean architecture: a hands-on guide to creating clean web applications with code examples in java*. Packt Publishing Ltd.

Jošt, G., Heričko, M., and Polančič, G., 2019. Theoretical foundations and implementation of business process diagrams' complexity management technique based on highlights. *Software & systems modeling*, 18(2), pp.1079–1095.

Lamport, L., 1994. *LATEX: a document preparation system: user's guide and reference manual*. Addison-wesley.

Latva-Koivisto, A.M., 2001. Finding a complexity measure for business process models.

Leff, A. and Rayfield, J.T., 2001. Web-application development using the model/view/controller design pattern. *Proceedings fifth ieee international enterprise distributed object computing conference*, pp.118–127.

Low, G. and Looi, R., 1997. An investigation of client/server application development methodologies. eng. *Journal of information technology*, 12(3), pp.187–196.

Moody, D., 2009. The "physics" of notations: toward a scientific basis for constructing visual notations in software engineering. *Ieee transactions on software engineering*, 35(6), pp.756–779.

Philipson, G., 1993. In search of client/server. *Informatics*. Vol. 1, 6, pp.23–8.

Richards, M., 2015. *Software architecture patterns*. Vol. 4. O'Reilly Media, Incorporated 1005 Gravenstein Highway North, Sebastopol, CA ...

Romhányi, Á. and Vámossy, Z., 2021. Benefits of layered software architecture in machine learning applications. *Improve*, pp.66–72.

Rumpe, B., 2016. *Modeling with uml*. Springer.

Sommerville, I., 2011. *Software engineering*. 9th. Boston, Mass. : Pearson, 2011.

University of Reading, 2019a. *Avoiding unintentional plagiarism: guidance on citing references for students at the university of reading: styles of referencing* [Online]. (accessed October 26, 2019). Available from: `https://libguides.reading.ac.uk/citing-references/avoidingplagiarism`.

University of Reading, 2019b. *Styles of referencing: guidance on citing references for students at the university of reading* [Online]. (accessed October 26, 2019). Available from: `https://libguides.reading.ac.uk/citing-references/referencingstyles`.